

HP ProLiant Cluster F500 Installation Guide



September 2006 (Second Edition)
Part Number 364775-002



© Copyright 2004, 2006 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Microsoft, Windows, and Windows NT are U.S. registered trademarks of Microsoft Corporation. Windows Server 2003 is a trademark of Microsoft Corporation. Intel, Pentium, and Itanium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. UNIX is a registered trademark of The Open Group.

September 2006 (Second Edition)

Part Number 364775-002

Audience assumptions

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

Contents

Overview of the ProLiant Cluster F500	5
HP ProLiant Cluster F500 overview	5
Hardware and software components	5
F500 for EVA configurations.....	5
Cluster cross-cable configuration	6
F500 for MA8000 configurations	6
Enhanced configuration.....	7
Multiple cluster configurations	8
HP OpenView Storage Management Appliance	8
Cluster interconnect	8
Redundant interconnects.....	9
Interconnect adapters.....	9
Client network.....	9
Ethernet direct connection.....	10
Cluster networking.....	10
Setting up the ProLiant Cluster F500 for Enterprise Virtual Array	11
Preinstallation instructions	11
Hardware setup and configuration	11
Setting Up the HP StorageWorks Enterprise Virtual Array	12
Setting Up the HP OpenView storage management appliance.....	12
Setting up the HP ProLiant servers	12
Updating the FCA device driver	13
Setting IP addressing and zoning for Fibre Channel switches	13
Creating zones	14
Downloading the latest FCA driver	15
Installing HP StorageWorks Secure Path	15
Logging on to the storage system	16
Creating the storage system and virtual disks	16
Configuring virtual disks on the host.....	17
Installing clustering	17
Setting up the ProLiant Cluster F500 for MA8000.....	19
Preinstallation instructions	19
Hardware setup and configuration	19
Setting Up the HP StorageWorks MA8000	20
Setting Up the HP OpenView storage management appliance.....	20
Setting up the HP ProLiant servers	20
Installing the HBA device driver	21
Downloading the latest HBA driver	21
Installing HP StorageWorks Secure Path	21
Setting IP addressing and zoning for Fibre Channel switches	22
Creating zones	22
Designating the server as a maintenance terminal.....	22
Turning on the storage subsystem power.....	23
Configuring the storage subsystem.....	23
Logging on to the storage system	24
Discovering the storage system and identifying the connections	24
Creating and presenting the virtual disks	24
Configuring virtual disks on the host.....	25

Configuring large LUNs (optional)	25
Installing clustering	25
Connection worksheet	26
Connection worksheet	26
Technical support	27
Before you contact HP	27
HP contact information	27
Acronyms and abbreviations	28
Glossary	30
Index	35

Overview of the ProLiant Cluster F500

In this section

HP ProLiant Cluster F500 overview	5
Hardware and software components	5
F500 for EVA configurations	5
F500 for MA8000 configurations	6
HP OpenView Storage Management Appliance	8
Cluster interconnect	8
Redundant interconnects	9
Interconnect adapters	9
Client network.....	9
Ethernet direct connection	10
Cluster networking.....	10

HP ProLiant Cluster F500 overview

The HP ProLiant Cluster F500 for Enterprise Virtual Array is a two-to-eight-node cluster solution (eight-node clustering is supported by Microsoft® Windows® Server 2003, Enterprise Edition) composed of HP ProLiant servers and the HP StorageWorks EVA storage system.

The HP ProLiant Cluster F500 for MA8000 is a two-node cluster solution composed of HP ProLiant servers and HP StorageWorks storage components. These cluster solutions execute on a Microsoft® Windows® Server 2003, Enterprise Edition platform or a Microsoft® Windows® 2000 Advanced Server platform with Microsoft® Cluster Service (two-node).

Hardware and software components

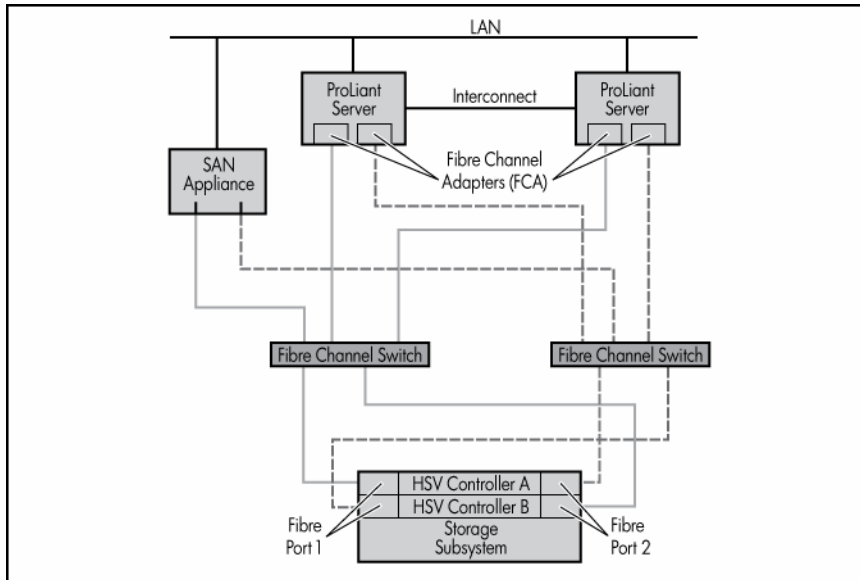
For a current list of supported hardware and software components, refer to the High Availability website (<http://www.hp.com/servers/proliant/highavailability>).

F500 for EVA configurations

The HP ProLiant Cluster F500 for EVA is a cluster with two Fibre Channel Adapters in each server, two switches, and two storage controllers. In an F500 configuration, each storage controller pair can be attached to a maximum of 240 drives.

Cluster cross-cable configuration

A cluster cross-cable configuration has no single point of failure. To enable dual paths to the storage, the HP StorageWorks Secure Path software must be installed on all servers. With Secure Path, data can flow simultaneously over both FCAs to the storage subsystem, and you can perform load balancing over the two paths to help maximize performance.



A component failure in this cluster results in a failover to a second component, and you can continue using the cluster. Some typical failures and responses in the enhanced configuration include:

- A server failure causes Microsoft® cluster software to fail over to the other node.
- An HBA or FCA failure causes subsequent data requests intended for the failed adapter to be routed over the remaining good adapter.
- A switch or cable failure is detected as an HBA or FCA failure, and a failover to the second adapter, which is using the remaining good switch and good cables, occurs.
- A controller failure causes the second controller to take over for the failed controller. Secure Path then routes the data requests to the second controller.

In all of the typical failures, interruptions to the user are minimal and, in some cases, might not even be noticeable.

F500 for MA8000 configurations

The HP ProLiant Cluster F500 for MA8000 configurations support Fibre Channel switches with the Array Controller Software and disaster-tolerant configurations.

The F500 can be set up in several different configurations, involving servers, switches, and storage subsystems connected through a Fibre Channel Switched Fabric:

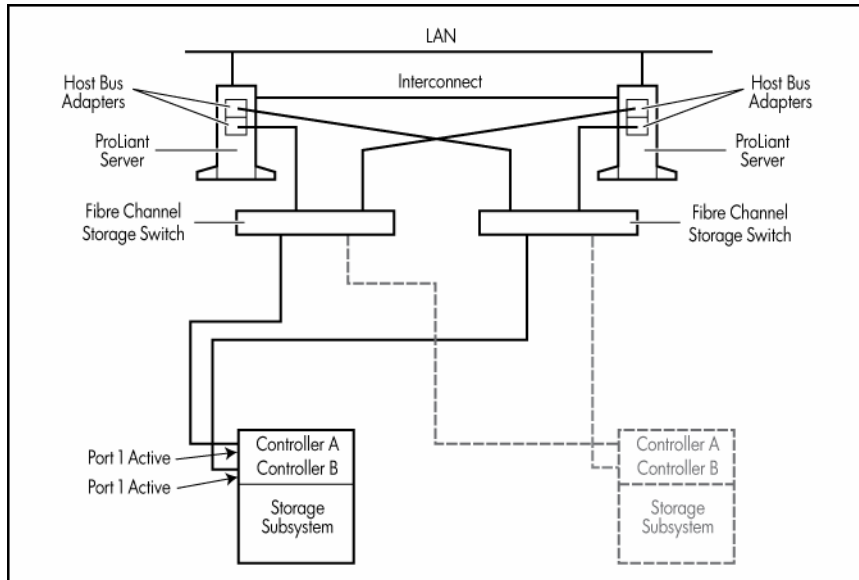
- The enhanced configuration is a cluster with two HBAs in each server, two switches, and two storage controllers, giving it increased availability over the basic configurations.
- Additionally, two to four clusters can be configured to use the same storage subsystems.

In an F500 configuration, a maximum of four storage controller pairs can be connected to a single cluster. This limitation dictates how many storage subsystems can be used in the cluster (a maximum of four storage subsystems or some combination of each type of storage unit).

Enhanced configuration

No single points of failure occur in an enhanced configuration. It improves on the basic configuration by adding a second HBA to each server and a second switch. The combination of second adapter, switch, and controller form a second independent path to the storage subsystem.

To enable dual paths to the storage, the Secure Path software must be installed on all servers. With Secure Path, data can flow simultaneously over both HBAs to the storage subsystem, and you can perform load balancing over the two paths to help maximize performance.



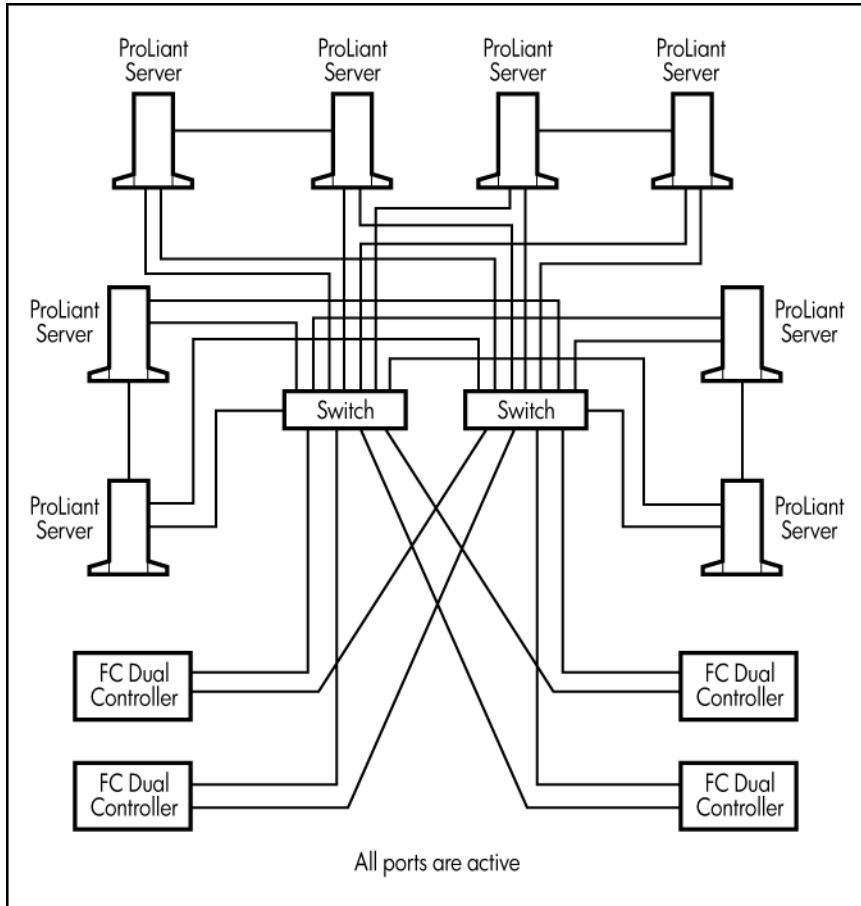
A component failure in this cluster results in a failover to a second component, and you can continue using the cluster. Some typical failures and responses in the enhanced configuration include:

- A server failure causes Microsoft® cluster software to fail over to the other node.
- An HBA or FCA failure causes subsequent data requests intended for the failed adapter to be routed over the remaining good adapter.
- A switch or cable failure is detected as an HBA or FCA failure, and a failover to the second adapter, which is using the remaining good switch and good cables, occurs.
- A controller failure causes the second controller to take over for the failed controller. Secure Path then routes the data requests to the second controller.

In all of the typical failures, interruptions to the user are minimal and, in some cases, might not even be noticeable.

Multiple cluster configurations

Up to four clusters can be combined into a single F500 for MA8000 configuration with the clusters accessing the same group of storage subsystems.



HP OpenView Storage Management Appliance

The HP OpenView Storage Management Appliance runs the HP StorageWorks Command View EVA software and the HSG Element Manager software. The Command View EVA software is the administrative interface to the EVA, and the HSG Element Manager software is the administrative interface to the MA8000. The application is browser-based and can be used from any machine on the same IP network as the management appliance.

Cluster interconnect

The cluster interconnect is a data path over which nodes of a cluster communicate. This type of communication is termed intracluster communication. At a minimum, the interconnect consists of two network adapters (one in each server) and a crossover cable connecting the adapters.

The cluster nodes use the interconnect data path to:

- Communicate individual resource and overall cluster status
- Send and receive heartbeat signals
- Update modified registry information



IMPORTANT: TCP/IP must be used as the cluster communication protocol. When configuring the interconnects, be sure to enable TCP/IP.

Redundant interconnects

To reduce potential disruptions of intracluster communication, use a redundant path over which communication can continue if the primary path is disrupted.

HP recommends configuring the client LAN as a backup path for intracluster communication. This provides a secondary path for the cluster heartbeat in case the dedicated primary path for intracluster communications fails. This is configured when installing the cluster software, or it can be added later using the MSCS Cluster Administrator.

HP offers a feature that configures two HP Ethernet adapters (or two ports on a single adapter) so that one is a hot backup for the other. There are two ways to achieve this configuration, called NIC Teaming, and the method you choose depends on the hardware. One way is through the use of the Redundant NIC Utility available on all HP 10/100/1000 Fast Ethernet products. The other option is through the use of the Network Fault Tolerance feature designed to operate with the HP 10/100/1000 Intel® silicon-based NICs.

For more information on recommended interconnect strategies, refer to the white paper, *Best Practices Checklist—Increasing Network Fault Tolerance in a Microsoft® Windows® Server 2003, Enterprise Edition High Availability Server Cluster*, available from the ProLiant High Availability website (<http://www.hp.com/servers/proliant/highavailability>).



NOTE: Only use NIC Teaming with NICs that connect to the client LAN. Do not use this feature with NICs used for the dedicated intracluster communication link. For detailed information about interconnect redundancy, refer to the HP white paper, *Increasing Network Availability in a Microsoft® Windows® Cluster*, available from the High Availability website (<http://www.hp.com/servers/proliant/highavailability>).

Interconnect adapters

Ethernet adapters and switches are supported as interconnects in ProLiant clusters. Either a 10-Mb/s, 100-Mb/s, or 1000-Mb/s Ethernet adapter can be used.



NOTE: For a list of supported interconnect adapters, refer to the Microsoft® Windows® Server 2003, Enterprise Edition, Windows® 2000 Advanced Server, and Microsoft® cluster software compatibility list available from the Microsoft® website (<http://www.microsoft.com>). Be sure that the adapter you select is on the list.



NOTE: An Ethernet crossover cable is provided in the HP ProLiant Cluster F500 for the Enterprise SAN kit. The crossover cable is for a two-node configuration only.

Client network

Every client/server application requires a LAN over which client machines and servers communicate. The components of the LAN are no different than with a stand-alone server configuration.

Because clients desiring the full advantage of the cluster will now connect to the cluster rather than to a specific server, configuring client connections will differ from those for a stand-alone server. Clients will connect to virtual servers, which are cluster groups that contain their own IP addresses.

Ethernet direct connection

A direct Ethernet connection uses only three components:

- Two interconnect adapters
- One Ethernet crossover cable

Connecting interconnect adapters directly to each other requires a special cable. If you are using Ethernet, an Ethernet crossover cable (included in the HP ProLiant Cluster F500 for the Enterprise SAN kit) must be used.

If you are using the Ethernet crossover cable supplied with your kit and installing Windows® 2000 Advanced Server, the interconnect network might not display during the cluster installation because the connection displays only if it is currently active at the time of installation. If the other cluster nodes are powered off at the time you install MSCS, the connection is considered inactive by Windows® Server 2003, Enterprise Edition and Windows® 2000 Advanced Server. In this case, define the existing public network connection as **all communications** during the installation. After MSCS is configured on all nodes, the interconnect network automatically shows in the networks group in Cluster Administrator.

To configure the networks for MSCS use after installing Windows® Server 2003, Enterprise Edition or Windows® 2000 Advanced Server:

1. Right-click the cluster name in Cluster Administrator.
2. Select **Properties**.
3. Select the **Network Priority** tab from the dialog box.
4. Configure the network roles as necessary.

Cluster networking

For troubleshooting information on this topic, refer to the following Microsoft® articles and related documentation on the Microsoft® website (<http://www.microsoft.com/support>).

- Q193890—*Recommended WINS Configuration for Microsoft Cluster Server*
- Q254101—*Network Adapter Teaming and Server Cluster*
- Q254651—*Cluster Network Role Changes Automatically*
- Q258750—*Recommended Private "Heartbeat" Configuration on a Cluster Server*

Setting up the ProLiant Cluster F500 for Enterprise Virtual Array

In this section

Preinstallation instructions	11
Hardware setup and configuration	11

Preinstallation instructions

Before setting up the F500, verify that the hardware and software kits are appropriate for this installation. For a current list of supported hardware and software components, refer to the High Availability website (<http://www.hp.com/servers/proliant/highavailability>).

Hardware setup and configuration

Verify that you have all the necessary hardware (minimum setup):

- Two ProLiant servers
- Two FCA cards for each server
- Two NIC cards for each server
- One EVA storage system
- Two Fibre Channel switches
- One HP OpenView Storage Management Appliance

Verify that you have all the necessary software:

- Command View EVA
- SmartStart CD
- Microsoft® Windows® Server 2003, Enterprise Edition or Microsoft® Windows® 2000 Advanced Server
- CD that came with the EVA platform kit
- HP StorageWorks Secure Path software

Set up the cluster using the following procedures:

1. "Setting up the HP StorageWorks Enterprise Virtual Array (on page 12)"
2. "Setting up the HP OpenView storage management appliance (on page 12)"
3. "Setting up the HP ProLiant servers (on page 12)"
4. "Updating the FCA device driver (on page 13)"
5. "Setting IP addressing and zoning for Fibre Channel switches (on page 13)"
6. "Creating zones (on page 14)"
7. "Creating storage aliases (on page 14)"

8. "Downloading the latest FCA driver (on page 15)"
9. "Installing HP StorageWorks Secure Path (on page 15)"
10. "Logging on to the storage system (on page 16)"
11. "Creating the storage system and virtual disks (on page 16)"
12. "Configuring virtual disks on the host (on page 17)"
13. "Installing clustering (on page 17)"

Setting Up the HP StorageWorks Enterprise Virtual Array

Install the following:

- Rack, drive enclosures, disk drives, and associated firmware
- Environmental Monitoring Unit
- HSV controllers

Refer to the EVA hardware documentation for detailed installation and setup instructions.

Setting Up the HP OpenView storage management appliance

1. Set up the management appliance.
2. Install the Command View EVA software.

Refer to the management appliance documentation for detailed setup and configuration instructions.

Setting up the HP ProLiant servers

1. Install the following hardware in the servers:

- a. FCAs

The FCA board plugs into a standard PCI slot in the host computer. Refer to the system manual for instructions on plugging in boards.



IMPORTANT: Record the FCA/HBA ID (12-digit IEEE address) and the server and adapter slot in which the adapter is installed. You will need this information when configuring switch zoning and creating the storage system and virtual disks. Use the Connection Worksheet (on page 26) to record the information.

- b. NICs

-
2. Cable the fiber connections to the servers, storage, and management appliance.
3. Set up and cable the Ethernet network.



IMPORTANT: You must have a working network to configure the storage with the management appliance.

-
4. Configure the servers using the SmartStart CD or Deployment Server.
5. Install one of the following operating systems:



NOTE: For supported operating system versions, refer to the HP website (<http://www.hp.com/servers/proliant/highavailability>).

- a. Microsoft® Windows® Server 2003, Enterprise Edition
 - b. Windows® 2000 Advanced Server

-
6. Verify that all the latest drivers and agents are loaded using the SmartStart CD.
7. Configure the public and private network cards.



NOTE: Refer to the Microsoft® Q articles ("Cluster networking" on page 10) on networking for detailed information.

8. Log on to the network domain controller.

Refer to your server documentation and FCA documentation for detailed installation instructions.

Updating the FCA device driver

This procedure updates Windows® Server 2003 or Windows® 2000 Advanced Server to the EVA-supported FCA driver version.

1. Insert the CD that came with the Enterprise kit into the server CD-ROM drive. If autorun is enabled, the installation program starts. Otherwise, navigate to the root directory of the CD, and double-click **install.bat**.
2. Click **Install Solution Software**.
3. Click **Perform Fibre Channel Adapter Driver Update** to start the Driver Update Utility.
When the driver installation finishes, a menu displays for additional software installation.
4. Click **Install Fibre Channel Software** to start the Fibre Channel setup wizard for the additional software installation.
5. Click **Finish** to restart the server when the setup wizard completes.
6. Repeat steps 1 through 5 for additional cluster nodes.

Setting IP addressing and zoning for Fibre Channel switches

Set IP addressing and zoning to meet your SAN requirements. Refer to the *HP StorageWorks Fibre Channel SAN Switch Management Guide* for detailed instructions.

The IP address setting procedures must be performed on every switch in the fabric.

Setting the Switch: 8, 16, 32 port

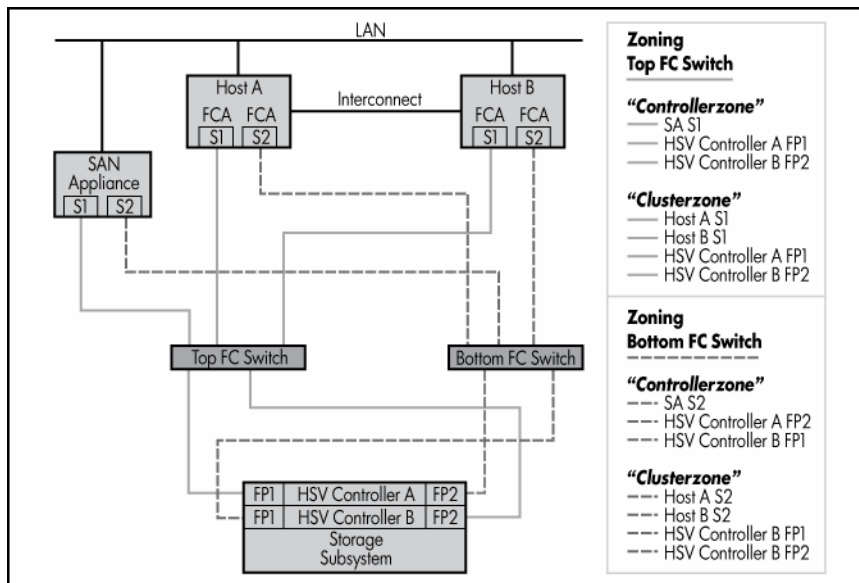
1. Connect a terminal or terminal emulator to the serial port of the switch.
2. Set the IP address.
3. Verify that the switch firmware level meets the storage system requirements. Refer to the *Heterogeneous Open SAN Design Reference Guide*.
4. Use a Web browser to monitor and manage the switch.

Verifying FCA firmware

Verify that the FCA cards have the correct firmware. For a list of current firmware, refer to the HP website (<http://www.hp.com/servers/proliant/highavailability>).

Creating zones

The following figure is an example of a cluster cross-cable zoning configuration setup.

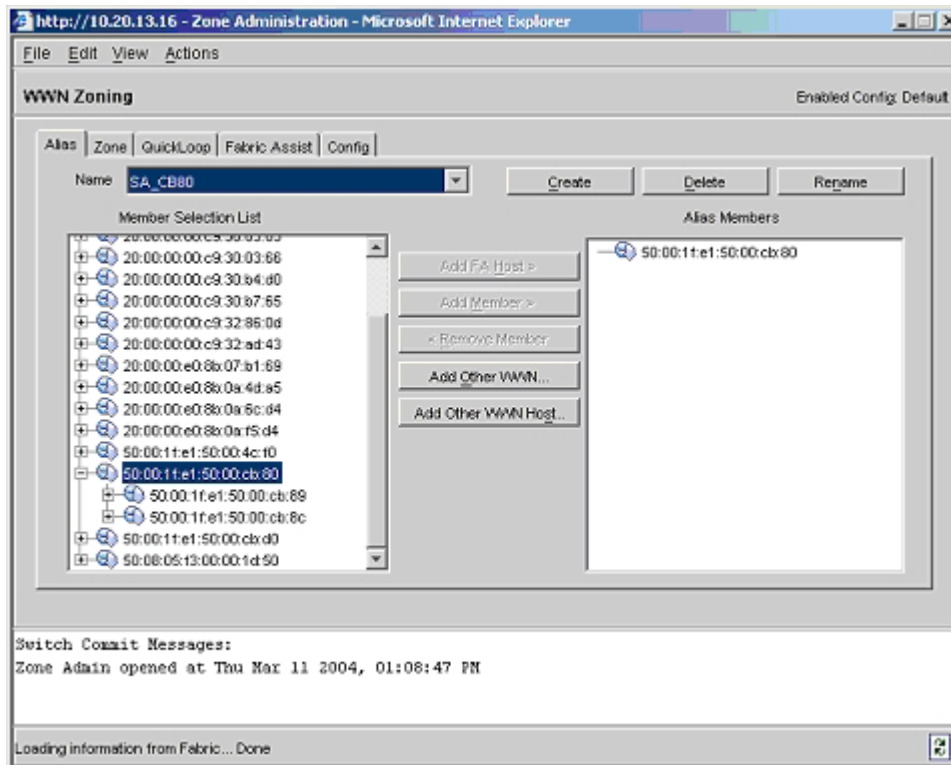


To create a controller zone, cluster zones, and a configuration zone, use the SAN switch GUI. Refer to the switch documentation for detailed information on using the GUI for setting up zones.

Creating storage aliases

To avoid a storage system being zoned out of the fabrics if the designations for Controllers A and B become reversed, HP recommends that you zone using the host WWN address for each fabric instead of the controller host port World Wide IDs.

In the example shown, the storage system host WWN is designated as 50:00:1f:e1:50:00:cb:80. Cabled to this fabric are Controller A, port 2 (50:00:1f:e1:50:00:cb:89) and Controller B, port 1 (50:00:1f:e1:50:00:cb:8c). The storage system host WWN is highlighted, and the ADD FA Host> button is used to place the storage system into the fabric.



The port WWIDs associated with the storage system WWN in each fabric would reverse if the Controller A and Controller B designations become reversed. Using host zoning, the switch uses any port WWID associated with the host WWN even if the port WWIDs change.

Downloading the latest FCA driver

1. Verify the FCA driver version installed on your system.
2. Go to the HP website (<http://www.hp.com/servers/proliant/highavailability>), select **Cluster configuration support matrices**, and check for the latest Fibre Channel Host Bus Adapter driver version supported.



IMPORTANT: Omit the following step if you have the latest FCA driver installed on your system.

3. Download the latest FCA driver update utility, and install the update utility on each server, one server at a time.

Installing HP StorageWorks Secure Path

Secure Path must be installed before any virtual disks can be recognized and configured. Follow the instructions that come with Secure Path for more specific installation and configuration information.

1. Install Secure Path using the latest kit. Follow the on-screen instructions. Configure the host in Secure Path to reflect the server and the monitor node.



IMPORTANT: Verify that reverse look-up is configured on the DNS server if you are using the FQDN.

2. Restart the servers.

3. Select **Computer Management (Local)>Device Manager**, and under Disk drives, verify that all the drives were discovered.

Logging on to the storage system

Use a supported Web browser to access the management appliance. A list of supported browsers is available in the documentation that comes with the Command View EVA software.

Refer to the EVA documentation for instructions on opening the Command View EVA.

1. Log in to the management appliance from any network browser.
2. Select **Devices>Command View EVA** to launch the Command View EVA.

Creating the storage system and virtual disks

To begin the configuration process, create or initialize the storage system. When you first view the EVA from the Command View EVA software, the storage pool is presented as "uninitialized storage."

Before the host servers can use the virtual disks, you must:

- Initialize the storage system.
- Add hosts to the storage system.
- Create and present virtual disks to hosts.

Refer to the online help within the Command View EVA for information on these procedures. All of these procedures must be completed for the hosts to use the virtual disks.

1. Initialize the storage with a descriptive name. Decide how to configure the disk groups during the initialization process. Choose to create either multiple disk groups or a single disk group.
2. Enter a license key if the management appliance requests one.
3. Configure the disk groups.
4. Set the storage system time.
5. Add the hosts to the storage system:
 - a. Select **Hosts**.
 - b. Click **Add a Host**.
 - c. Enter a host name.
 - d. Enter the correct IP address.



IMPORTANT: If the wrong IP address is entered and saved at the end of this procedure, it cannot be changed without deleting and recreating the host.

- e. Click **Next Step**.
 - f. Enter an adapter port WWN. Use the Connection Worksheet (on page 26) to correctly identify which FCA card is located in each server. Select the correct WWN from the list.
 - g. Select **Microsoft® Windows®** as the operating system.
 - h. Click **Next Step**.
 - i. Select **Finish>OK**.
 - j. Click **Add a Port**.
 - k. Select the second FCA from the list.
 - l. Select **Finish>OK**.
 - m. Repeat steps a through l for the next host.
6. Create the virtual disk drives:

- a. Click **Virtual Disks**.
 - b. Click **Create VD Fam.**
 - c. Assign the virtual disk name.
 - d. Select a Vraid.
 - e. Select the correct Prefer path/mode. **Path A-Failover only** or **Path B-Failover only** are the only options supported for clustering.
 - f. Select **Finish>OK**.
 - g. Repeat steps a through f to create the virtual disks needed based on the number of logical units you will have.
7. Present the virtual disk drives to all hosts in the cluster:
- a. Select a physical disk.
 - b. Click **Present**.
 - c. Select a host.
 - d. Select **Finish>OK**.
 - e. Click **Present**.
 - f. Select the next host.
 - g. Select **Finish>OK**.
 - h. Verify that the presented hosts are on the same logical unit number.
 - i. Select another physical disk, and repeat steps a through h until all virtual disks in the cluster are presented to the hosts.

Configuring virtual disks on the host

After you have set up the virtual disks on the EVA and rescanned or restarted the host, follow the host-specific conventions for configuring these new disk resources. These new virtual disk resources then become usable to the host system just like any other disk or device resource.

Windows® Server 2003, Enterprise Edition and Windows® 2000 Advanced Server require that disks be partitioned, formatted, and assigned drive letters. Windows® 2000 Advanced Server also requires selecting the disk type (select **Basic only**). Use the Disk Management utility within the Computer Management application to configure the virtual disks using standard Windows® 2000 conventions.

1. Power down all servers, except one.
2. Use Disk Management or Disk Administrator to configure the newly discovered drives:
 - Select the disk type (**Basic only**).
 - Partition the disks.
 - Perform an NTFS format on each disk.
 - Assign disk drive letters. Drive letters typically run from E to Z. Label the drive volumes as, for example, Drive E, Drive F, or Drive Z for easy identification.

Installing clustering

1. Shut down all of the nodes, except one.
2. Install clustering on the first node.
3. Reboot the first node.
4. Power up the next server. Allow enough time for the server to discover the paths and LUNs presented to the cluster.
5. Install clustering on the second node, and have it join the existing cluster.

6. Reboot the second node.
7. If you want additional nodes to join the cluster, power them up individually and allow them enough time to discover the paths and LUNs presented to the cluster.
8. Install your applications.
9. Repeat steps 1 through 8 for each cluster.

Setting up the ProLiant Cluster F500 for MA8000

In this section

Preinstallation instructions	19
Hardware setup and configuration	19

Preinstallation instructions

Before setting up the F500, verify that the hardware and software kits are appropriate for this installation. For a current list of supported hardware and software components, refer to the High Availability website (<http://www.hp.com/servers/proliant/highavailability>).

Hardware setup and configuration

Verify that you have all the necessary hardware (minimum setup):

- Two ProLiant servers
- Two HBA cards for each server
- Two NIC cards for each server
- One MA8000 storage system
- Two Fibre Channel switches
- One HP OpenView Storage Management Appliance

Verify that you have all the necessary software:

- HSG Element Manager
- SmartStart CD
- Microsoft® Windows® Server 2003, Enterprise Edition or Microsoft® Windows® 2000 Advanced Server
- HP StorageWorks Secure Path software

Set up the cluster using the following procedures:

1. "Setting up the HP StorageWorks MA8000 (on page 20)"
2. "Setting up the HP OpenView storage management appliance (on page 20)"
3. "Setting Up the HP ProLiant servers (on page 20)"
4. "Installing the HBA device driver (on page 21)"
5. "Downloading the latest HBA driver (on page 21)"
6. "Installing HP StorageWorks Secure Path (on page 15)"
7. "Setting IP addressing and zoning for Fibre Channel Switches (on page 13)"
8. "Creating zones (on page 22)"

9. "Designating the server as a maintenance terminal (on page 22)"
10. "Turning on the storage subsystem power (on page 23)"
11. "Configuring the storage subsystem (on page 23)"
12. "Logging On to the Storage Subsystem ("Logging on to the storage system" on page 24)"
13. "Discovering the Storage System and Identifying the Connections (on page 24)"
14. "Creating and Presenting the Virtual Disks (on page 24)"
15. "Configuring Virtual Disks on the Host (on page 25)"
16. "Installing clustering (on page 25)"

Setting Up the HP StorageWorks MA8000

Install the following:

- Rack, drive enclosures, disk drives, and associated firmware
- HSG controllers

Refer to the documentation that was shipped with the storage subsystem for detailed installation instructions.

Setting Up the HP OpenView storage management appliance

1. Set up the management appliance.
2. Install the HSG Element Manager software.

Refer to the management appliance documentation for detailed setup and configuration instructions.

Setting up the HP ProLiant servers

1. Install the following hardware in the servers:
 - a. HBAs

The HBA board plugs into a standard PCI slot in the host computer. Refer to the system manual for instructions on plugging in boards.



IMPORTANT: Record the FCA/HBA ID (12-digit IEEE address) and the server and adapter slot in which the adapter is installed. You will need this information when configuring switch zoning and creating the storage system and virtual disks. Use the Connection Worksheet (on page 26) to record the information.

- b. NICs
2. Cable the fiber connections to the servers, storage, and the management appliance.
3. Set up and cable the Ethernet network.



IMPORTANT: You must have a working network to configure the storage with the management appliance.

4. Configure the servers using the SmartStart CD or Deployment Server.
5. Install one of the following operating systems:



NOTE: For supported operating system versions, refer to the HP website (<http://www.hp.com/servers/proliant/highavailability>).

- a. Microsoft® Windows® Server 2003, Enterprise Edition
 - b. Windows® 2000 Advanced Server
6. Verify that all the latest drivers and agents are loaded using the SmartStart CD.
7. Configure the public and private network cards.



NOTE: Refer to the Microsoft® Q articles ("[Cluster networking](#)" on page 10) on networking for detailed information.

8. Log on to the network domain controller.

Refer to your server documentation and HBA documentation for detailed installation instructions.

Installing the HBA device driver

This procedure installs the Windows® Server 2003, Enterprise Edition or Windows® 2000 Advanced Server to the MA8000-supported HBA driver version.

1. Insert the CD that came with the MA8000 kit into the server CD-ROM drive. If autorun is enabled, the installation program starts. Otherwise, navigate to the root directory of the CD and double-click **launch.exe**.
2. Click **Solution Software for Windows**.
3. Click **Perform Multiple Driver Update** to start the Driver Update Utility.
When the driver installation finishes, a menu displays for additional software installation.
4. Click **Fibre Channel Software Setup** to start the Fibre Channel setup wizard for the additional software installation.
5. Click **Finish** to restart the server when the setup wizard completes.
6. Repeat steps 1 through 5 for the second server.

Downloading the latest HBA driver

1. Verify the HBA driver version installed on your system.
2. Go to the HP website (<http://www.hp.com/servers/proliant/highavailability>), click **Cluster configuration support matrices**, and check for the latest Fibre Channel Host Bus Adapter driver version supported.



IMPORTANT: Omit the following step if you have the latest Fibre Channel HBA driver installed on the server.

3. Download the latest HBA driver update utility, and install the update utility on each server, one server at a time.

Verifying HBA firmware

Verify that the HBA cards have the correct firmware. For a list of current firmware, refer to the HP website (<http://www.hp.com/servers/proliant/highavailability>).

Installing HP StorageWorks Secure Path

Secure Path must be installed before any virtual disks can be recognized and configured. Follow the instructions that come with Secure Path for more specific installation and configuration information.

1. Install Secure Path using the latest kit. Follow the on-screen instructions. Configure the host in Secure Path to reflect the server and the monitor node.



IMPORTANT: Verify that reverse look-up is configured on the DNS server if you are using the FQDN.

2. Restart the servers.
3. Select **Computer Management (Local)>Device Manager**, and under Disk drives, verify that all the drives were discovered.

Setting IP addressing and zoning for Fibre Channel switches

Set IP addressing and zoning to meet your SAN requirements. Refer to the *HP StorageWorks Fibre Channel SAN Switch Management Guide* for detailed instructions.

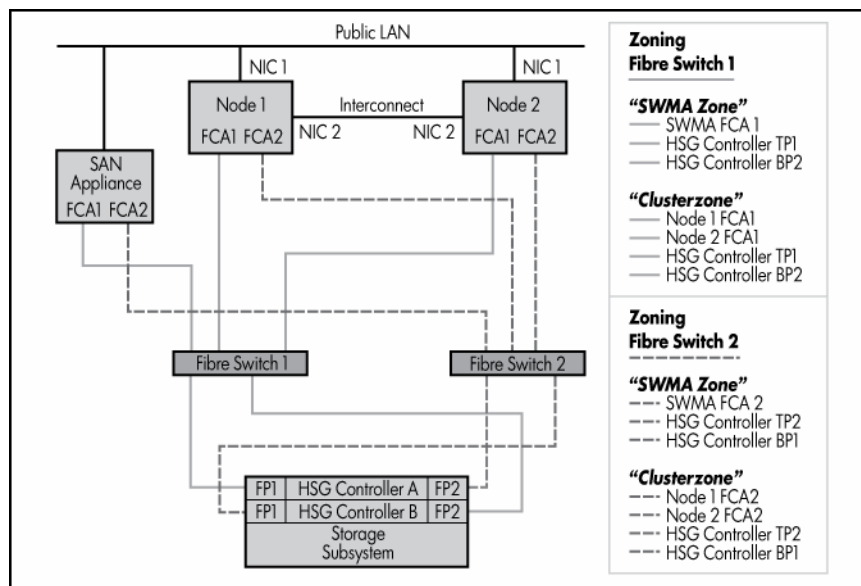
The IP address setting procedures must be performed on every switch in the fabric.

Setting the Switch: 8, 16, 32 port

1. Connect a terminal or terminal emulator to the serial port of the switch.
2. Set the IP address.
3. Verify that the switch firmware level meets the storage system requirements. Refer to the *Heterogeneous Open SAN Design Reference Guide*.
4. Use a Web browser to monitor and manage the switch.

Creating zones

The following figure is an example of a cluster cross-cable zoning configuration setup.



To create a controller zone, cluster zones, and a configuration zone, use the SAN switch GUI. Refer to the switch documentation for detailed information on using the GUI for setting up zones.

Designating the server as a maintenance terminal

A server must be connected to the storage controller to provide a maintenance terminal.



NOTE: Only one server should be designated as the maintenance terminal. It is recommended that a separate stand-alone server that is not part of the cluster be designated as the maintenance server.

1. Connect the RJ-12 connector on the communications cable to the maintenance port on the storage controller.
2. Connect the 9-pin serial connector on the communications cable to either the COM1 or COM2 port on the server.



NOTE: Record which serial port is used. This information will be needed when setting up the communications program and configuring the controller.

Turning on the storage subsystem power

1. Connect the storage subsystem cabinet to an AC power outlet.
2. Switch the storage subsystem power to the on position. (This step refers to RA8000/ESA12000 storage subsystems only, as the other supported systems are powered on through connected devices.)
3. Wait until the storage subsystem is completely booted and ready to operate.
4. Power on both servers.

The storage subsystem is ready to operate when the Reset LED on the storage controller flashes at a rate of one time per second.

Configuring the storage subsystem

1. Connect the serial cable that was provided with the HSG80 controller to a monitor node or server, which will be used to initially configure the MA8000. Refer to the HSG80 documentation regarding establishing a HyperTerminal connection to the storage subsystem.
2. Set the node id and check sum. This information can be found on a sticker on the controller enclosure.
Example: `set this node_id=5000-1fe1-0007-1350 7k`
3. Reboot the controller.
Example: `restart this`
4. Place the controllers in a multibus failover configuration because they will be in an Active/Active configuration.
Example: `set multibus_failover copy=this`
5. Set the correct date and time on the controllers.
Example: `set this time=dd-mmm-yyy:hh:mm:ss`
Example: `set this time=18-feb-2004:18:50:00`
6. Run the frutil utility on each controller to set the correct battery expiration date if you are using cache batteries instead of a global UPS.
`run frutil`

Select **yes** to replace the battery, and then press **enter** when prompted.
Manually move the serial cable to the other controller.
7. Configure the controllers to use mirrored cache.
Example: `set this mirrored_cache`
8. Run the config utility to set up the logical drives. The storage subsystem must identify how many disks are present.
`run config`
9. Set the system to SCSI-3 mode.
`set this SCSI_version=SCSI-3`
10. Turn on all four fiber ports on the controllers. For the HP OpenView Storage Management Appliance to see the storage subsystem, all ports on the HSG80 controllers must be turned on.



NOTE: This example assumes the HSG80 controllers are attached to fabric switches.

Example:

```
set this port_1_topology=fabric
set this port_2_topology=fabric
set other port_1_topology=fabric
set other port_2_topology=fabric
```

Logging on to the storage system

Use a supported Web browser to access the management appliance. A list of supported browsers is available in the documentation that comes with the HSG Element Manager software.

Refer to the HP OpenView Storage Management Appliance documentation for instructions on opening the HSG Element Manager.

1. Log in to the management appliance from any network browser.
2. Select **Devices>HSG Element Manager** to launch the HSG Element Manager.

Discovering the storage system and identifying the connections

If this is the first time the HP OpenView Storage Management Appliance discovers the HSG80 controllers, the management appliance must be granted access to the controllers.

1. Click **Options**.
2. Select **Enable** on the pair of controllers that the management appliance will manage.
The storage subsystem might take a few minutes to be fully discovered by the management appliance.
3. After the management appliance fully discovers the storage subsystem, select the controller, by expanding the tree view, to identify the connections.
4. Click **Hosts**.

A minimum of 12 connections should be present if the two zones were configured correctly on the fabric switches. There should be a total of eight connections created by the two cluster nodes and four connections created by the management appliance. If the management appliance does not see the correct number of connections, you might have to reboot your nodes or the management appliance.



NOTE: HP recommends renaming the connections to something more meaningful for ease of troubleshooting. Use the Connection Worksheet (on page 26) to correctly identify the connections. Refer to the MA8000 reference documentation (<http://h18006.www1.hp.com/products/storageworks/acs/g80windows.html>) for instructions on renaming your connections.

Creating and presenting the virtual disks

1. Click **Virtual Disks**.
2. Click **Create Virtual Disks**.
3. Select the type of redundancy requirements for the new virtual disk. Select from the list of available physical disks.
If a preferred controller is required, you can specify a preferred path, **This Controller** or **Other Controller**.
4. Present the Virtual Disks to all the nodes of the cluster.
5. Select the connections that belong to the cluster node.
6. Repeat steps 1 through 5 for additional drives.



NOTE: When presenting your virtual disks to the cluster nodes, be sure not to select the connections that belong to the management appliance.

Configuring virtual disks on the host

After you have set up the virtual disks on the MA8000 and rescanned or restarted the host, follow the host-specific conventions for configuring these new disk resources. These new virtual disk resources then become usable to the host system just like any other disk or device resource.

Windows® Server 2003, Enterprise Edition and Windows® 2000 Advanced Server require that disks be partitioned, formatted, and assigned drive letters. Windows® 2000 Advanced Server also requires selecting the disk type (select **Basic only**). Use the Disk Management utility within the Computer Management application to configure the virtual disks using standard Windows® 2000 conventions.

1. Power down one server.
2. Use Disk Management or Disk Administrator to configure the newly discovered drives:
 - Select disk type (**Basic only**).
 - Partition the disks.
 - Perform an NTFS format on each disk.
 - Assign disk drive letters. Drive letters typically run from E to Z. Label the drive volumes as, for example, Drive E, Drive F, or Drive Z for easy identification.



NOTE: It is a good practice to label the drives to make it easier to verify all the disk drives are seen correctly by the second server in step 4.

3. Power down the first server.
4. Power up the second server to verify that all the disk drives are seen correctly. Verify that both servers see the drives identically, in the same sequence. If not, make the necessary changes.

Configuring large LUNs (optional)

Refer to the HP StorageWorks Secure Path documentation.

Installing clustering

1. Shut down one of the nodes.
2. Install clustering on the first node.
3. Reboot the first node.
4. Power up the second server.
5. Install clustering on the second node, and have it join the existing cluster.
6. Reboot the second node.
7. Install your applications.
8. Repeat steps 1 through 7 for each cluster.

Connection worksheet

In this section

Connection worksheet..... 26

Connection worksheet

Use the following table to record the adapter, controller port, server, and switch port information needed when configuring the switch zoning and creating the storage system and virtual disks.

FCA/HBA WWN (IEEE address)	HSV/HSG controller port WWN	Server and slot number	Switch port number

Technical support

In this section

Before you contact HP.....	27
HP contact information.....	27

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- In the United States, see the HP US service locator webpage (http://www.hp.com/service_locator).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
 - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
 - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (<http://www.hp.com>).
- In other locations, see the Contact HP worldwide (in English) webpage (<http://welcome.hp.com/country/us/en/wwcontact.html>).

Acronyms and abbreviations

ACS

Array Controller Software (on page [30](#))

DNS

domain name system

EVA

Enterprise Virtual Array (on page [31](#))

FCA

Fibre Channel adapter

FQDN

Fully Qualified Domain Name

GUI

graphical user interface

HBA

host bus adapter (on page [32](#))

IP

Internet Protocol

LAN

local-area network

LUN

logical unit number

MSCS

Microsoft® Cluster Server/Service

NIC

network interface controller

NTFS

NT File System (on page [33](#))

RAID

redundant array of inexpensive (or independent) disks

SAN

storage area network

SCSI

small computer system interface

TCP

Transmission Control Protocol

VCS

Virtual Controller Software (on page [34](#))

WWID

World Wide ID

WWN

World Wide Name

Glossary

active/active

A dual-controller, dual-adapter storage subsystem configuration in which both controller-adapter I/O paths have access to separate LUNs.

active/standby

A dual-controller, single-adapter storage subsystem configuration in which one controller is in an online state and has control of the logical storage units. The other controller is in a standby state.

adapter

A device that converts the protocol and hardware interface of one bus type into another without changing the function of the bus.

array

All the physical disk drives in a storage system that are known to and under the control of a controller pair.

Array Controller Software

Software contained on a removable ROM program card that provides the operating system for the array controller.

availability

A measure of how well a computer system or cluster can continuously deliver services to its clients. Availability is typically expressed as a percentage, with 100% being the best possible rating.

cluster

A group of systems that work collectively as a single system to provide fast, uninterrupted computing service. Clustering is a way to increase availability, processing capacity, and I/O bandwidth.

cluster group

A collection of interdependent resources that logically represents a clustered client/server function. This is a user-definable entity used by Microsoft® Cluster Server software.

controller

A hardware device that, with proprietary software, facilitates communications between a host and one or more devices organized in an array.

dedicated interconnect

A type of interconnect that is used solely for intracluster (node-to-node) communication. Communication to and from network clients does not occur over this type of interconnect. *Also called* private interconnect.

disk group

A physical disk drive set or pool in which a virtual disk is created. A disk group can contain all the physical disk drives in a controller pair array or a subset of the array.

driver

A hardware device or a program that controls or regulates another device. For example, a device driver is a driver developed for a specific device that enables a computer to operate with that device, such as an HBA or a disk drive.

dual-redundant configuration

A controller configuration consisting of two active controllers operating as a single controller. If one controller fails, the other controller assumes control of the devices on the failing controller.

Enterprise Virtual Array

The HP name used to describe the storage system that includes HSV controllers, storage devices, enclosures, cables, and power supplies. *Also known as the Enterprise Storage System.*

Ethernet

A standard network protocol that operates mostly on a physical level, using network interface cards and cabling to transmit data between computers. Transfer rates are normally 1,000 or 10,000 Mb/s.

fabric

The multiple Fibre Channel switches interconnected and using Fibre Channel methodology for linking nodes and routing frames in a Fibre Channel network.

failback (cluster)

1. The process that takes place when a previously failed controller is repaired or replaced and reassumes the workload from a companion controller.
2. The process that takes place when the operation of a previously failed cluster group moves from one cluster node back to its primary node.

failover (cluster)

1. The process that takes place when one controller in a dual-redundant configuration assumes the workload of a failed companion controller. Failover continues until the failed controller is repaired or replaced.
2. The process that takes place when the operation of a cluster group moves from one cluster node to another node in the same cluster.

fault tolerance

The ability of a system or component to continue normal operation when a fault (or failure) is encountered. Tolerance is achieved primarily by designing redundant elements into the system.

Fibre Channel

An IEEE standard for providing high-speed data transfer among workstations, servers, mainframes, supercomputers, desktop computers, storage devices, and display devices.

Fibre Channel Adapter

An adapter used to connect the host server to the fabric.

heartbeat

A signal transmitted between cluster nodes to indicate whether the nodes are operating.

high availability

A term used to identify a computer system that can continuously deliver services to its clients 99.9 % of the time (no more than 8.5 hours of downtime per year).

host

The primary or controlling computer in a system of computers connected by communication links.

host bus adapter

A card used to connect a peripheral device to a host server.

input/output

A term that pertains to input and output functions.

interconnect

A physical connection between cluster nodes that transmits intracluster communication.

intracluster communication

The type of communication in which the cluster interconnect is a data path over which nodes of a cluster communicate. At a minimum, the interconnect consists of two network adapters (one in each server) and a cable connecting the adapters.

IP address

Internet Protocol address. An address assigned to a network interface card, which computer entities use to locate and communicate with each other. IP addresses can be statically or dynamically assigned.

logical unit

Commonly called a LUN (which is the acronym for logical unit number). A physical or virtual device addressable through a target ID number. Logical units use the target bus connection to communicate on the SCSI bus. The host sees a virtual disk as a logical unit.

logical unit number

1. A value that identifies a specific logical unit belonging to a SCSI target ID number. LUN is commonly used in reference to a logical unit.
2. A number associated with a physical device unit during the I/O operations of a task. Each task in the system must establish its own correspondence between logical unit numbers and physical devices.

maintenance terminal

An EIA-423-compatible terminal used with the controller. This terminal is used to identify the controller, enable host paths, enter configuration information, and check the controller status.

multibus

A dual-controller, dual-adapter storage subsystem configuration in which both controller-adapter I/O paths have access to separate LUNs. *Also known as active/active.*

network interface controller

A board that enables a computer to be connected to a network and that works with the network operating system to control the flow of information over the network.

node

An individual server in a cluster.

NT File System

A file organization system by which data is stored and accessed in a Windows® operating system.

partition

A logical division of a container, represented to the host as a logical unit.

port

1. In general terms, a logical channel in a communication system.
2. The hardware and software used to connect a host controller to a communications bus, such as a SCSI bus or serial bus.

redundancy

The provision of multiple, interchangeable components to perform a single function to cope with failures and errors. A RAID set is considered to be redundant when user data is recorded directly to one member and all of the other members include associated parity information.

Redundant Array of Inexpensive Disks

A method of using hard disk drives in an array to provide data redundancy to increase system reliability and performance.

reliability

The continuous integrity of a system (server, storage, network, or cluster).

resource

A software or hardware entity on which a client/server application or service is dependent. As it pertains to Microsoft® Cluster Server, a cluster resource must have the ability to be managed by the cluster and must reside on one of the cluster nodes. A resource can be a member of only one group.

shared resource

A type of cluster organization in which some resources are accessible to all systems in the cluster.

Small Computer System Interface

A standard parallel interface for rapid data transmission.

storageset

A group of devices configured with RAID techniques to operate as a single container.

system

A complete computer system capable of operating independently.

Virtual Controller Software

Software used by the HSV controllers.

virtual disk

A simulated disk drive created by the controllers as storage for one or more hosts. The host computer sees the virtual disk as “real,” with the characteristics of an identical physical disk. See *also* logical unit.

Vraid0

A virtualization technique that provides no data protection. Reading and writing to a Vraid0 virtual disk is very fast and makes the fullest use of the available storage.

Vraid1

A virtualization technique that provides the highest level of data protection. All data blocks are mirrored on separate physical disks. Mirroring takes the most storage space.

Vraid5

A virtualization technique that uses parity striping to provide moderate data protection. Parity is a data protection mechanism for a striped virtual disk. A striped virtual disk has data divided into chunks and distributed on the physical disks comprising the disk group in which the virtual disk was created. If the striped virtual disk has parity, another chunk (a parity chunk) is calculated from the set of data chunks and written to the physical disks. If one of the data chunks becomes corrupted, the data can be reconstructed from the parity chunk and the remaining data chunks.

World Wide Name

World Wide Name. A unique Fibre Channel identifier consisting of a 16-character hexadecimal number. A WWN is required for each Fibre Channel communication port.

Index

A

- active/active configuration 23
- Array Controller Software (ACS) 6
- authorized reseller 27

B

- battery expiration date 23

C

- cables, failover scenario 6, 7
- client LAN 9
- client network, features 9
- cluster configurations, EVA 5
- cluster configurations, MA8000 6
- cluster interconnect, adapters 9
- cluster interconnect, features 8
- cluster interconnect, overview 8
- cluster networking 10
- cluster, installing 17, 25
- Command View EVA, features 8
- Command View EVA, logging on to storage system 16
- Command View EVA, supported browsers 16
- communication protocol, TCP/IP 8
- config utility 23
- configuration, active/active 23
- configuration, cluster cross-cable 6
- configuration, enhanced 7
- configuration, EVA cluster hardware 11
- configuration, large LUN 25
- configuration, MA8000 cluster hardware 19
- configuration, multibus failover 23
- configuration, multiple cluster 8
- configuration, network 10
- configuration, zoning 14, 22
- contact information 27
- contacting HP 27
- controllers, failover scenario 6, 7
- creating storage aliases 14
- customer self repair (CSR) 27

D

- date and time 23
- driver update utility, HBA 21
- drives, maximum 5

E

- enhanced configuration 7
- Ethernet adapters 10
- Ethernet crossover cable 10
- EVA cluster hardware, setup and configuration 11
- EVA cluster software components, required 11
- EVA storage system, creating 16
- EVA storage system, login procedures 16

F

- F500 overview 5
- failback 31
- failover 31
- failover scenarios 6, 7
- FCA device driver, updating 13
- FCA driver, downloading procedures 15
- FCA, verifying firmware 13
- Fibre Channel switches, configuring 13
- firmware, verifying FCA 13
- firmware, verifying HBA 21
- frutil utility 23

H

- hardware supported 5, 11, 19
- HBA device driver, installing 21
- HBA driver, downloading procedures 21
- HBA, verifying firmware 21
- help resources 27
- high availability website 5, 9, 11
- host server, configuring virtual disks 17, 25
- HP StorageWorks Enterprise Virtual Array, setup and configuration 12
- HP StorageWorks Fibre Channel switches, setting IP addresses 13
- HP StorageWorks MA8000, setup and configuration 20

HP Technical Support 27
HSG Element Manager 8

I

installation, clusters 17, 25
installation, HBA device driver 21
installing, Secure Path 15
interconnect, cluster 8, 9
intracenter communication 8
IP addresses, setting up 13

L

LAN 9
LAN, features 9
large LUNs, configuring 25
load balancing 6, 7
login procedures, EVA storage system 16
login procedures, MA8000 storage system 24

M

MA8000 cluster hardware, setup and configuration 19
MA8000 cluster software components, required 19
MA8000 storage system, login procedures 24
MA8000, configuring 23
maintenance terminal 22
Microsoft Cluster Server/Service (MSCS) 28
multibus failover, configuring 23
multiple cluster configuration 8

N

network interface controller (NIC) 28
network, local area 9
networking, cluster interconnect 8, 9
networking, configuration 10
networking, TCP/IP protocol 8
NIC Teaming 9

O

overview, F500 5

P

phone numbers 27
private interconnect 30
ProLiant Cluster F500, overview 5
ProLiant servers, setup and configuration 12, 20

R

redundant interconnects, features 9
required information 27

S

SAN Management Appliance, features 8
SAN Management Appliance, setup and configuration 12, 20
SAN switch GUI 14, 22
Secure Path, installing 15
server, designating maintenance terminal 22
servers, failover scenario 6, 7
servers, setup and configuration 12, 20
setup procedures, EVA cluster 11
setup procedures, MA8000 cluster 19
single point of failure 6, 7
software components, Command View EVA 8
software components, HSG Element Manager 8
software supported 5, 11, 12, 20
storage aliases, creating 14
storage connections, identifying 24
storage system, discovering 24
storage, configuring MA8000 23
StorageWorks Fibre Channel switches, setting IP addresses 13
subsystem power 23
support 27
supported browsers, Command View EVA 16
supported hardware 5, 11, 19
switches, failover scenario 6, 7

T

TCP/IP (Transmission Control Protocol/Internet Protocol) 8
technical support 27
telephone numbers 27
Transmission Control Protocol/Internet Protocol (TCP/IP) 8

U

updating, FCA device driver 13
utility, config 23
utility, frutil 23

V

virtual disks, configuring 17, 25
virtual disks, creating 16, 24
virtual disks, presenting 24